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ABSTRACT

Potential policies and strategies for building the information society (IS) in countries that are candidates for admission to the European Union were explored at a workshop attended by 39 experts from the European Commission (EC), the EC's Institute for Prospective and Technological Studies, and outside the EC. The workshop focused on the specific context for IS developments in candidate countries, paying special attention to the following topics: infrastructures; info-structures; capabilities and skills; and assessment of the present IS in candidate countries. The workshop also examined transferable lessons from selected information and computer technology (ICT)- related experiences in the European Union's 15 member states. After concluding that a simple scenario for the road forward does not exist, the workshop participants presented a series of provisional conclusions regarding how to put IS policy strategies at the service of countries' democratic development while optimizing their resources and economic output. (Sixty-eight endnotes, a 14-item bibliography, and a list of experts from the panel workshop are included. The following items are appended: lists of policy and research implications by the experts in the workshop's concluding session; a list of structural indicators for evaluating countries' needs; an action plan for creating an IS for all of Europe; definitions of ICT activity; and a list of ICT goods in the Standard International Trade Classification.) (MN)

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Building the Information Society in Candidate Countries? A prospective analysis on potential trajectories to realise the Lisbon goals.

IPTS Experts Workshop Report
23-25 February 2003, Sevilla

Final Version

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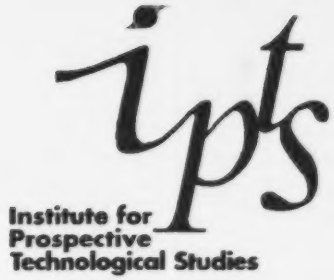

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PROLOGUE

The subject of this report – the Information Society in Candidate Countries (CCs)[1] – has received up till now little or no academic attention. Also, the most basic data on the ICT sector in the candidate countries are missing and what exists (from official or consultancy sources) raises serious heuristic problems with regard to comparability, accuracy and reliability. This report relies on research done at IPTS and by the European Science and Technology Observatory (ESTO)[2], as well as the excellent material our networks of 'local' researchers and experts from EU15 and CCs gave us – networks IPTS has been building since 1999 around the Enlargement topic. More particularly, we very much relied on a process of validation which is specific for much of IPTS work and which is a result of its mission: giving scientific independent policy support to the EC. This validation is done by bringing together key experts on the subject and from the CCs, presenting them with our research and achieving a consensus[3].

This report is an essential but intermediary step forward. It explores some of the most common assumptions about the Information Society (IS) potentials in Candidate Countries. While finalising it, IPTS is simultaneously launching a large country-by-country exercise about the future of the IS in the CCs and its link to the Lisbon objectives. These outputs should be published early 2004 and offer a relevant follow-up to the conclusions of the present report.

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[1] The thirteen "Candidate countries" are: The Baltic republics of Estonia, Lithuania and Latvia; The Mediterranean countries Turkey, Malta and Cyprus; The Central European ones Bulgaria, Czech Republic, Hungary, Poland, Romania, Slovakia, Slovenia. "The negotiations have been concluded with Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovak Republic and Slovenia. After ratification these countries will join the EU on 1st May 2004. Detailed roadmaps have been agreed for Bulgaria and Romania, which offer them the perspective of membership from 2007 and the prospect established of starting Turkey's accession negotiations without delay after December 2004 if it fulfils the Copenhagen political criteria." (European Commission, 2003. Choosing to grow: Knowledge, innovation and jobs in a cohesive society. Report to the Spring European Council, 21 March 2003 on the Lisbon strategy of economic, social and environmental renewal. COM(2003) 5 final, p.21. EC, Brussels.)

[2] Detailed data for the arguments developed in this report are available in the reports presented as list of references at the end of this report

[3] The full list of experts who directly contributed to the 23-25 February Workshop and reviewed this report is presented at the end of this paper

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1. Introduction

An ambitious target for the European Union was formulated by the Lisbon Council of Ministers (Spring 2000), to be reached in the next 10 years:

"Europe has today set itself a new strategic goal for the next decade: to become the most competitive and dynamic knowledge-based economy in the world capable of sustainable economic growth with more and better jobs and greater social cohesion. Achieving this goal requires an overall strategy aimed at:

- preparing the transition to a knowledge-based economy and society by better policies for the Information Society and R&D, as well as by stepping up the process of structural reform for competitiveness and innovation and by completing the internal market;
- modernising the European social model, investing in people and combating social exclusion;
- sustaining the healthy economic outlook and favourable growth prospects by applying an appropriate macro-economic policy mix.

(...) The shift to a digital, knowledge-based economy, prompted by new goods and services, will be a powerful engine for growth, competitiveness and jobs. In addition, it will be capable of improving citizens' quality of life and the environment".[4]

Since the Lisbon Summit of EU Heads of State and Government in March 2000, the EU's strategic goal has been to modernise the European economy, making it creative and knowledge-based. At the political level, the EU Spring Summit of 2003[5] again underlined the importance of accelerating economic reforms in order to realise this vision. Competitiveness has been placed centre stage in order to create an environment in which enterprise and entrepreneurs can flourish within an enlarged and open internal market. Boosting investment in knowledge is seen as the best guarantee of innovation and for a skills-based workforce, as well as for economic growth.

As Commissioner Liikanen states: a competitive environment, the single market and knowledge targeted investment "should help to unlock productivity growth. Productivity (...) is the key to increase real wages, create sustainable competitiveness of companies, and achieve a wider tax base for public services. Electronic communications are a powerful engine for growth, competitiveness and jobs. Action must be taken now to consolidate this strength that we have in Europe. We need to boost the momentum behind the Information Society".[6]

ICT`s are thus clearly expected to play a key role in the Lisbon objectives and all 13 Candidate Countries have signed up to this strategy, to be implemented in the eEurope 2005 Action Plan, while adapting their national legislative and institutional frameworks to the constraints of the *Acquis Communautaire*[7]. Given their overall social, political and economic situations, it is unclear which Information Society Strategy to follow in each CCs.

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[4] European Council, Lisbon, March 2000. Expanded at Gothenburg and refined at Stockholm and Barcelona.

[5] The Spring Summits of Head of State and Government assess annually the progress towards the Lisbon targets. The 2003 Summit was organised in Brussels (March 2003).

[6] Liikanen E., March 2003. Challenges of the Information Society. Speech at the "Swiat Telekommunicacji Symposium". Warszaw, March 2003.

[7] The *Acquis* integrates all the European laws and rules adopted on the basis of the EU's founding treaties, mainly the treaties of Rome, Maastricht and Amsterdam. Its transposition in national laws and implementation conditions has been negotiated with the first applicant countries since the 31st of March 1998. The *Acquis* is presented in 31 Chapters, Chapter 19 being the chapter on "Telecommunications, IT and Postal Services". The "Telecommunication" *Acquis* has been updated in February 2002 and CCs are required to transpose and apply the modified legislation by the time they enter the European Union. Negotiations were concluded with the ten

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In order to identify the different issues, we put forward the following questions that are sequentially addressed in the following sections:

- What characteristics of the CCs could contribute to the successful development of an Information Society? Are there specific economic, social, political or technological prospects (or threats) in the CCs, which should be taken into account? (Section 2)
- Did we learn anything from the EU15 experience that is transferable to the CCs? To what extent is IS development a local context-specific or a global market-dependent issue? How can ICT production and use support growth opportunities? Is industrial development of the ICT sector one of the major opportunities for the CCs? (Section 3)
- Finally, in view of the Lisbon targets – "to become the most competitive and dynamic knowledge-based economy in the world" - what policy would best help the CCs to meet that objective and where does the policy paradigm need to be re-thought? To what extent would such IS development meet the challenges of the emerging Knowledge-based Society? (Section 4)

"Accessing countries" in December 2002. Compliance with the *Acquis* is reported for each country in the EC "Regular Reports".

2. The specific context for IS developments in Candidate Countries

Future opportunities and possible barriers for IS development in the CCs may be clustered around three enabling areas or necessary components for building an Information Society: networks (infrastructure), services and applications (info-structure) and skills (capabilities).[8]

2.1 Infrastructures

The rate at which an Information Society can be constructed is strongly dependent on the availability and affordability of ICTs to individuals, organisations and the society as a whole. Most data confirms that, in the CCs, there is no purely technical reason why technological leapfrogging should not be possible.

For example, the spectacular growth of 2G (GSM) mobile subscribers in the CCs (nearly 100% compound average annual growth between 1995 and 2001 vs. 56% in EU15) illustrates this technological potential. Mobile phone penetration per 100 inhabitants has, in a relatively short period of time, overtaken fixed line penetration in Czech Republic, Estonia, Hungary, Slovak Republic, Slovenia and Turkey.

Fixed and Mobile penetration in CCs, 2001[9]

	Mobile subscribers		Fixed lines	
	per 100 inhabitants	CAGR (%) 1995-2001	per 100 inhabitants	CAGR (%) 1995-2001
Bulgaria	19	106	36	2.8
Cyprus	46	37	63	2.6
Czech	66	128	37	8
Estonia	46	68	35	4.1
Hungary	50	64	37	10.1
Latvia	28	90	31	1.7
Lithuania	25	100	31	3.6
Malta	35	52	53	2.4
Poland	26	127	30	12.1
Rumania	17	175	18	5.7
Slovak	40	136	29	5.5
Slovenia	76	95	40	4.4
Turkey	30	87	29	4.9
Average CCs	39	97	36	5

In this context, third generation mobile telephony (3G) is seen by some as an ideal platform from which the CCs could 'leapfrog' into a new generation of information infrastructure. It would achieve both voice and data delivery, and allow the CCs to leapfrog from a situation of insufficient terrestrial infrastructure and long telephone waiting lists, to a ubiquitous, wireless and/or mobile Internet platform. 3G licences have been granted in four CCs (end 2002).

[8] This more holistic approach was first introduced by R. Mansell and U.Wehn (ed.), 1998. Knowledge Societies. Information Technology and Sustainable Development. United Nations;. Oxford University Press. We decided to follow that in order not to fall into the trap of techno centrism or luddism.

[9] Source: ITU, 2002

List of 3G licences granted in CCs (mid. 2002)

	Operator	Technology	Licence cost	License duration in years	License awarded on	Operational date requirement	Coverage requirements
CZ	Eurotel	W-CDMA	$97m	20	Dec-01	Jan-05	90% of Prague by 2005
	Radio Mobil	W-CDMA	$106m	20	Dec-01		
PL	Centertel	W-CDMA	$613m	25	Dec-00	Postponed to Jan 2005	20% of pop. by end 2004; 40% by end 2007
	Polkomtel	W-CDMA	$613m	23	Dec-00		
	PTC	W-CDMA	$613m	25	Dec-00		
SK	Orange	W-CDMA	$32m	20	Jul-02	Jan-04	20% of pop. within 18 months of license entering into effect
	Eurotel Bratis.,	W-CDMA	$32m	20	Jul-02		
SI	Mobitel	W-CDMA	$82.2m	15	Nov-01	Jan-04	31/12/03: 53.6% 01/07/05: 59.3% 01/07/07: 68.2%

Sources: Compiled from Global Mobile, IBM, 3GNewsroom.com

However, a number of considerations, financial (license costs[10], deployment costs, revenues and ROI simulations, financial health of the sector) rather than technical, suggest that fast 3G nation-wide deployment is not a realistic short term option in most CCs, when the wide gaps in the basic network coverage and the need to comply with the universal service objectives are considered.

With a few exceptions, Western European 3G license holders are now considering leveraging on 2.5G instead, and are keen to extend the deadline imposed by their licenses to deploy 3G. Wireless innovations (e.g. smart antennas) can increase mobile network capacity and bandwidth and have the potential to improve the chances of success for the 2.5G leverage strategy and lower its costs, an important consideration for the CCs. In these countries, most operators could therefore adopt a wait-and-see approach with 3G, taking advantage of their limited involvement to date. If they deploy 2.5G solutions today, they can decide whether to make their 3G investments later, on the basis of the lessons learned in EU15, without having to bear the risks and costs upfront.

For these financial rather than technical reasons, the main platform for accessing the Internet in the CCs remains the traditional telephone line (PSTN). But, given the insufficient development of the fixed infrastructure (in particular in rural areas), mobile technologies (initially 2.5G) have also the potential to become the complementary platform for accessing the Internet.

Still some CCs (e.g. Estonia, Malta, Cyprus, Slovenia and Slovakia) are performing very well in terms of fixed infrastructure and have achieved in 2000 a higher Internet penetration rate (measured as users per 1000 inhabitants) than some EU Member States. Similarly, Estonia and Slovenia have reached EU15 levels in terms of mobile usage and personal computer penetration. It should also be noted that CATV is quite well developed in most CCs. More than 50% of all households with television in Slovakia, Romania and Malta, for example, have CATV connections. Thus, in those CCs where CATV infrastructures are configured to allow bi-directional telecom traffic, CATV may be considered another essential future opportunity, more so than in the EU15, for the provision of low cost information and communication services to end-users.

[10] The total amount of 3G licenses costs paid across EU15 has been 11 time more expensive than all 2G licenses and many CC governments have been eager to replicate EU15 auctioning levels.

The high rate of technology adoption observed (i.e. GSM) and the introduction of changes to the telecommunications market (the adoption of the *Acquis*, Chapter 19) may have raised excessive expectations that CCs will be able to catch up – and even leapfrog - in technological terms in a short period of time. However, as progress in ICTs is correlated to a large extent with the level of economic development and the purchasing power of the population, countries with low per capita GDP are not capable of sustaining such a high rate of ICT penetration growth. On average, the CCs continue to lag behind EU Member States in most if not all measures of ICT access and usage. Furthermore, the overall economic situation in the CCs – and the resulting uneven revenue distribution - is widening the gap between the people and organisations who can access advanced technologies and services and those for whom they are a luxury.

At the moment there are large differences in technology diffusion according to geographic location, economic and social status or age. In Turkey nearly 77% of all computers are owned by 40% of all households.[11] These belong to the highest socio-economic groups, while the low economic group, including around 40% of the households, owns only 10% of all computers. In Latvia and Bulgaria, less than 15% of households have computers.[12] In Hungary, the Internet is mainly used by educational institutions (44%), followed by corporations and government (29%) and finally individuals and small companies (27%).[13] In Estonia 58% of Internet users are between 19 – 29 years old, while only 7% of users are between 50 – 74.[14] The high price of usage is a serious barrier for the wide spread of new communication technologies. Hungary and Poland, for example, have the highest Internet access charges during off-peak time among OECD countries.[15] The low teledensity and long waiting lists in some of the CCs - e.g. more than 3% of the population in Poland, Romania, Bulgaria and Turkey - also hamper Internet penetration and pose serious threats of growing regional disparities in the provision of access to new communication networks and services.

This growing digital divide in the CCs is however much more complex than that in EU15:

- rural/urban distribution: an estimated one third of the CCs population lives in rural areas, particularly in the largest countries such as Turkey, Poland and Romania, and some 22% of total population make their living from agricultural activities, sometimes at subsistence level.
- regional disparities: two thirds of all NUTS2[16] regions in CCs show significantly low figures[17] in relation to labour and revenue indicators, with extremes often reached in border regions, small provincial towns and peripheral former industrial conglomerates.
- demographic trends: the ageing of the population is driving the demographic outlook for CCs[18]. The transition years have seen a fall in fertility rates and strong outward migration with resulting decreasing populations in many countries. Today, demographic projections show that the trend, mainly for shortly beyond 2010, is even more adverse than in EU15.

An example of the impact of such disparities can be seen in the distribution of fixed line penetration between rural and urban areas in some countries. It can range from 0%-100%,

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[11] TUENA, Turkish national information infrastructure masterplan, TUENA final report,
[12] Eurostat, Statistics in focus, IS Statistics, 27, 2001
[13] ITU, Internet in a transition economy: Hungary case study, 2001, http://www.itu.int/ti/casestudies
[14] Surveys carried out by Baltic Media Facts Ltd., http://www.bmf.ee
[15] http://www.oecd.org/dsti/sti/it/cm
[16] "Nomenclature of Statistical Territorial Units", commonly referred to as NUTS, after the French acronym. Regional borders are determined by the different sizes of countries and administrative divisions, which developed in the course of history. As a result, the regional units may differ in area and population.
[17] Such as for example above 50% unemployment rates among the 15-24 years old
[18] With the strong exception of Turkey and slightly better figures for Malta

with no telecommunication services at all in small peripheral towns and rural villages and almost 100% penetration on new digital exchanges in capital cities.[19] Also, though an increase in national telephone penetration rates has been observed - an average of 77% of households[20] now have fixed telephone lines - the lack of quality and reliability of these fixed telephone lines affects 50% of the calls in some regions and significantly limits the use of these lines for Internet purposes.

With Enlargement it is estimated that the income gap between regions in EU28 will double as compared with the gap in the existing EU15.[21] The impact and complexity of the potential digital divide resulting from this fact, added to the disparities mentioned above, is expected to be such that it could endanger market growth, social cohesion and democratic participation.

The picture of the ICT industry of these countries is as complex. The economic transformations in the last decade, the inflow of foreign direct investment (FDI) and the ability of companies in the CCs to absorb new technologies and integrate large international production chains have contributed to the emergence of new patterns of local industry specialisation. Domestic IT companies in most CCs, without financial resources to modernise their production, were not able to compete with multinationals and have shrunk, particularly during the privatisation period, into small producers in limited niche markets. Many hardware companies have been integrated into the product life cycle of western companies through subcontracting or outsourcing, assembly, distribution, reverse engineering, etc. Consequently, manufacturing industries belonging to the ICT sector are increasing exports to the EU15.[22] Hungary is in a very strong position, as it has significant specialisation in office machinery and computers and 'electronic components', while in Poland the TV, radio and recording equipment industry has been a top exporter since 1995. The Czech Republic is also playing a growing role in these market segments, while Estonia has been selected as a manufacturing and assembly centre by high-tech western companies. Malta has a comparative advantage in electronic products, which accounted for about half of its exports in 1999[23] - which, of course, remain small, while the Turkish electronics industry shows a strong position with its exports of consumer electronics and telecommunications equipment. The potential role of the ICT industry in CCs, including its software segment, will be explored in a further section of this report.

The demand side of the Information Technology (IT) hardware market in the CCs has grown remarkably over the past few years, mainly due to government procurement projects and foreign investment. It should be noted that as a percentage of GDP, ICT expenditure in Hungary (6.42%), Slovakia (5.98%) and the Czech Republic (8.49%) was higher than in Germany (5.27%) and Finland (5.88%), while in Romania (1.78%), Bulgaria (1.76%) and Turkey (2.47%) it is still comparatively very low.[24] However, according to Eurostat data[25], the total size of the IT hardware market in 2000 in all CCs was about 5 billion Euro (Poland and Turkey taking more than 60% of the whole market), compared to 235 billion Euro for the EU15.

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[19] eEurope+ 2003, Progress report, June 2002

[20] eEurope+ 2003, Progress report, June 2002

[21] Stated in: European Commission, 2000. The Second Report on Economic and Social Cohesion. European Commission. Brussels. Belgium

[22] Havlik et al., Competitiveness of industry in CEE candidate countries, WIIW, 2001

[23] Eurostat, Statistics in focus, European Union FDI with Candidate countries: an overview, 26, 2000

[24] Data for 1999, World Development Indicators 2001

[25] Eurostat, IS Statistics, quoted above

Finally, in the telecommunication market the presence of (dominant) foreign operators in Candidate Countries and their present financial situation exposes the investments in these countries to the fluctuations of the global telecom market.

2.2 Info-structures

In the CCs, the rapid growth of domestic web-sites and web portals in local languages and the provision of governmental interactive services and on-line content have been stimulated to a large extent by the strong demand from businesses and civil society on the one hand and government commitments to EU policies on the other.

During this last decade, CCs' populations have been offered generalised access to international information sources. There has also been a blossoming of national on-line content initiatives, brought about by the need to overcome language barriers and also by the rapid growth of domestic web sites, e.g. of ministries, higher education institutions, local authorities, libraries, media, etc., facilitating access to local content. Consequently, most public authorities in CCs focus on the establishment of new information systems and public registers and the modernisation of existing ones, as well as the provision of on-line access to public information. However, the dispersed nature of these information sources, found in various public bodies at national and local level, make it very difficult for citizens and businesses to access and use them. Therefore, the trend for 'one-stop-shopping' gains increasing importance in communication between public institutions and citizens or industry. The lack of experienced specialists in public administration for managing websites, creating customer-oriented interdepartmental information and offering regular updates of on-line information, even though perceived as a weakness, is an opportunity for outsourcing these activities and for the growth of SMEs exploiting the potential for added value services based on public information.

The development of IS applications in healthcare, transport, culture, tourism, etc. is also gaining importance in the CCs:

- In all countries, education seems to be the leading application sector, mainly at higher education levels. Publicly-funded broadband networking and early use of ICT-based communication tools are some factors that originated this trend
- A number of projects have focused on preservation of traditions, folklore and national heritage for future generations, making them available to other people all over the world
- Access has been provided to many large public libraries, virtual museums, art galleries and music fairs via the Internet.
- In the area of healthcare, the potential of ICTs has been used in various cases for improving the quality of medical services and making specialised knowledge available to hospitals or primary healthcare organisations. In addition, scarce specialist healthcare resources have been deployed efficiently using network techniques, in particular remote diagnosis and consultation.

Media production, starting with traditional media such as newspapers, is taking off strongly on the Internet. On-line newspapers are normally free of charge on the net, albeit with less content than their paper counterparts. They sometimes offer readers' feedback or forum opportunities, specialised journals and news archives, mainly as paid services. These initiatives, as in EU15 and around the world, are confronted with the issue of developing a sustainable revenue model. In such circumstances, it is the financial solidity of the traditional media, and the provision of government support to on-line initiatives, which may be decisive in the long term. As far as broadcasting media is concerned, the newly established regulatory

frameworks in CEEC[26] have fostered media pluralism and programme diversity. The availability of a number of private national and regional TV channels and radio stations, providing broadcasting services via cable, air or satellite, will hopefully increase public choice and the availability of various high-quality educational, information, entertainment, and sports programmes.

Government initiatives and technological development in the CCs are pro-actively focused on the establishment of a favourable environment for development of e-commerce and a knowledge-based economy. Despite the fact that business players have undertaken different initiatives for providing end-consumers with on-line services, creating virtual shops or taking the first steps towards setting-up systems for e-business, the business-to-consumer market is still very limited. The few customers that use the Internet do so predominantly to receive information and to order products or services, paying on delivery. Interestingly, analysis shows that most of the banks offer Internet banking services.[27] However, consumer adoption is still very low with some rare exceptions such as Estonia, with 18-25% of the population making use of Internet banking. The variety and complexity of adoption barriers (low PC and Internet penetration, security and privacy concerns, underdeveloped financial services, underdeveloped electronic banking culture, low trust in banking institutions) point at the need to consider the demand and adoption dynamics, beyond the info-structure supply side, in order to build the Information Society. Business-to-business commerce is also in its infancy – companies use electronic networks mainly to access market news or analysis and new business offers, and to communicate with suppliers - while contracts and business deals are carried out by direct contacts and by traditional means.

The advent of the Internet, digital broadcasting platforms and e-commerce initiatives raises several new issues for the CCs, for example:

- the protection of consumers' rights;
- the protection of citizens' rights, such as the access to quality content in an overall context of low per-capita revenues; the infringement of ethnic, religious and minority rights; etc.
- the protection of intellectual property;
- the merging of domestic media companies into large multinational corporations and their impacts on press and culture;
- the development of new business models to ensure the viability of e-commerce and new media initiatives.

All these are global prerequisites. However, in the newly-established democracies and economies of most CCs, it seems more challenging to find the right balance between regulatory and self-regulatory rules, and to ensure both freedom of information and expression and protection from illegal or harmful content and disclosure or misuse of private information.

It is also of vital importance to build up a critical mass in investment and usage, and to create awareness of the profitability and potential benefits of public and private partnerships, in order to maximise the potential for the content industry in CCs. Governments could, at the same time, act as a driving force towards an 'Information Society for all'. The private sector will play a vital role in this endeavour. While incumbent media companies further develop the re-purposing and cross-promoting of content across multiple distribution channels, net-native companies offer targeted content or delivery options in niche markets. The key here,

[26] CEEC: Central and Eastern European Countries: refers in this report to the 10 east European countries from the ex-communist regime.

[27] On this subject see also: Centeno C., 2003. Internet banking in an enlarged Europe. ICT challenges towards eEurope 2005. IPTS Internal Working Paper. IPTS, Sevilla, Spain.

fundamental to a competitive industry, is for the CCs to become 'producer' as opposed to 'consumer' countries.

As in most EU15 countries, the spread of ICTs among businesses in the CCs is a market-driven phenomenon rather than a real strategic choice to go on-line.[28] As already stated, investment capacity, especially domestic investment, is still relatively weak, and in such circumstances risky options are usually left aside. However, internal organizational factors may well be the biggest obstacle to taking the right decisions and overcoming organizational inertia. Additionally, the conservative attitude of most customers, the lack of trust in security of technologies and the fear of misuse of personal and business information further influence companies' investment and adoption of ICT-based strategic options. Insufficiently developed logistics systems and lack of professional home delivery services are further obstacles in this respect, as well as the predominance of English language materials on the web. Surveys additionally point to obstacles related to the limited diffusion of ICT's, banking products and security enhancing technologies.[29]

Bearing the above in mind, it seems very ambitious to state that many companies in the CCs will soon be in a position to adopt and apply e-commerce technologies in order to leapfrog economic development and hence join the EU on a more competitive basis. Only countries such as Estonia, and possibly Slovenia, may be in a position to successfully meet this ambitious challenge.

2.3 Capabilities and Skills[30]

Despite the downturn of the "new economy" in EU and the US, the ICT market in the CCs is growing, driven by some major factors, such as government emphasis on IS, new regulatory environment, modernisation of the economy, FDI, etc. Subsequently, ICT employment growth corresponds to the expansion of new market segments related to the development of the Internet, e-commerce and IS applications and services. It is not surprising, therefore, that unfilled vacancies are found at all levels of ICT professionals: IT technicians and managers, programmers, systems analysts, network and systems support engineers, application developers, business software implementation consultants, graphics designers, etc. Similarly to the US, there is a specific demand in the CCs for technological skills in Java, C++, Oracle, HTML programming, etc. There is also a specific demand for IT trainers and lecturers and central administration and local government institutions face serious problems in finding appropriate IT staff.

The recruitment difficulties in the CCs indicate an imbalance between existing skills and the needs of companies or administrations. Therefore, outsourcing is often the solution to e-business issues. The availability of favourable employment conditions for ICT workers is regarded as an indication of tight labour markets. In order to keep their qualified IT staff, companies in the CCs are increasing wages or providing non-wage benefits (flexible work schedule, holidays, additional social services, etc.). Higher salaries are reported in the capital cities and in foreign-owned companies, as well as in software companies or banks. In most CCs, the average salaries of software specialists are about twice as high as the country average. Compared to the wages in the ICT sector in OECD countries, these average monthly wages are still considerably lower. In Bulgaria, Poland, Hungary, Romania and the Baltic countries this is regarded as one of the reasons why young ICT specialists migrate.

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[28] Eade Ph. et al., A survey of e-business, Business Central Europe, March 2000, Delia Meth-Cohn

[29] PricewaterhouseCoopers (2000), EU Enlargement challenges, Focus on e-business

[30] On this subject, see also: Gourova E., 2003. Insight into ICT professional skills and jobs in the Candidate Countries. IPTS, Sevilla, Spain.

The growing ICT labour shortages are acknowledged as a serious threat for future ICT-related developments in many CCs. Estimated shortages comprise 6,000 IT specialists for Estonia, 4,300 network specialists in Hungary, and could reach 40% for network administrators in Poland (by the end of 2003). As within EU15, skill shortages are mainly observed in the area of networking, integration of applications in the front and back office and in deployment of e-business strategies.

Additionally, the CCs face the challenge of providing suitable education for the digital age while massive economic and social changes are going on. The steep economic decline in these countries makes offering a common high standard and tackling new challenges in the education system very difficult. Despite this, the introduction of ICTs is an important educational topic and is firmly on CCs national policy agendas. The availability of computers and their connection to the Internet is seen as essential for ICT-based learning processes and this has dominated the first phase of introduction of ICTs in education. However, while technologies and skills are now available, the integration of ICT's in the learning process is hampered by the lack of appropriate electronic books or multimedia contents and tools in the local language. The emphasis of CCs' governments and the collaboration of all actors – teaching staff, software developers, content producers, learning content distributors, etc. - may facilitate the development of educational materials meeting e-learning requirements. The ultimate factor for success in the e-learning field is the human factor. While at the policy level it is clear that schools should be connected to the Internet, the ability of teachers to adapt effectively to new technologies in the learning environment is problematic despite many training programmes to re-train teachers and prepare them for the changing learning environment.

The transitional period and, in particular, the restructuring of the economy have also seriously affected both vocational education and traditions of on-the-job-training, severing existing links with enterprises, and causing cut backs in the support system for learning. Also, insufficient financial resources have limited the ability of enterprises to provide on-the-job training and qualification courses to their employees.

The medium and longer-term supply of ICT professionals is associated generally with the trends in higher education and vocational schools. At present, increasing numbers of young people are studying beyond secondary level in most CCs. As a response to the demand for management and business skills, relatively high proportions of students are choosing business-related subjects. The high numbers students studying engineering, a traditional strength in higher education in many CCs, are now decreasing (except in Estonia and Romania). This is due to the redundancy of engineering staff in industry. In comparison, students in engineering subjects in Turkey almost doubled in 1991-1998.

As far as computing is concerned, Eurostat observes a slight decrease in 'computing' graduates only in Slovakia. Among OECD members, Slovakia and the Czech Republic have a higher percentage of tertiary level graduates in 'computing' than in any other study field -, more than the US and Finland. Hungary and Poland have the lowest percentage of 'computing' graduates, though the broad technical knowledge and skills of many engineers in these countries have provided a good basis for their employment in ICT-related jobs. A closer look at ICT-related subjects in Hungary shows that, in the period 1993-2000, the number of students enrolled in 'computer and mathematical programming' and 'computertechnics' almost doubled, whereas the students in some traditional subjects like 'telecommunications', 'microelectronics', 'control and system engineering' seriously declined. The high number of students in 'technological and economic informatics' may correspond to business demand for interdisciplinary skills.

Despite overall growth in enrolments, it is estimated that the number of ICT graduates in many CC is not sufficient to meet growing demands. Another worrying tendency is noted in Estonia and Bulgaria, where IT students are finding jobs in industry and leaving universities before graduation.

Many initiatives, in response to the increased ICT training needs of the labour force, focus on building an open, flexible and transparent life-long learning system, in all CCs.[31] Schemes aimed at encouraging company-training activities have been launched in Cyprus, Malta and Hungary. In Slovenia existing company-based training facilities have been transformed into inter-company or regional practical training centres. Along with traditional forms of training, CCs are also seizing the opportunities that distance education offers them, mainly through the financial support of international institutions, e.g. EU, UNDP, World Bank, etc.

Considering the problems that the education system faces and the speed with which ICT competencies become outdated, larger companies establish their own programmes in order to retrain employees. In Bulgaria, Cisco has its own academy, in the Baltic states Microsoft runs authorized training programmes, and IBM computer classes are part of the University of Latvia. This tendency to private certification is particularly important for the enterprises involved in ICT development and maintenance, as well as the major users and providers of knowledge-intensive services. Specialized training and re-training courses are also offered for bank and telecommunications employees and computer specialists.

The training of managers and leaders is another important issue. While the Mediterranean countries have more experience of market economies, in the transition decade the CEEC have had to prepare managers able to increase the competitiveness of their companies and adapt them to the rapidly changing technological and market conditions. Although there are some indications that individual entrepreneurship is driving the start up of economic activity in CCs, in particular in the service sector, lack of entrepreneurship and aversion to risk are still claimed to be weaknesses of businesses.[32] As the EBRD pointed out in the 2000 Transition report, foreign investors have experienced more difficulties in finding good managers than IT or financial staff.

Last but not least, IT company labour conditions in the developed countries exacerbate the situation in lower wage countries, as they attract their best-trained specialists. Some CCs (e.g.Bulgaria, Estonia) are worried about the brain-drain of IT professionals. According to OECD[33] estimates for example, around 50% of all Turkish post-graduate students in the US are potential emigrants. A World Economic Forum survey[34] states that talented people would rather remain in Poland and the Czech Republic, whereas the probability of a brain-drain is much higher in Bulgaria and Slovakia. In Latvia, some hopes are expressed that talented people working abroad will return (brain circulation) and that the best IT specialists are unlikely to emigrate due to the high living standards they enjoy at home.[35]

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[31] European Training Foundation (2000), Review of progress in vocational education and training reform of the Candidate countries for accession to the EU in the light of developments in European policy on vocational training

[32] EBRD (2000), Transition report 2000

[33] OECD (2001d), p. 44

[34] Quoted by Centre for Economic Development, p.110

[35] Tukisa (1999), An important anniversary for the University of Latvia's Mathematics and Informatics Institute, Baltic IT Review,1999, 15, p.11

2.4 Assessment of the present IS in the CCs

Taken together, these trends illustrate the capacity of CCs:

- to catch up in technological terms
- to develop numerous content-related initiatives in media, e-business and e-government
- to integrate existing global companies
- to develop competitive niches for local industry, mainly in software and content services
- to use local knowledge and geographic situation as competitive assets.

However, the low investment capabilities of the domestic industry and the low purchasing power of the population hinder balanced economic and social development and the building of a critical mass of usage. As a result, there is a high risk that a large digital divide will develop which will weaken the economy and social cohesion and threaten democratic development in these countries.

The formation of human capital is also a key issue. CCs are focusing on meeting human resource needs in the ICT sector and generally building excellence in some areas of science and technology, while doing too little about their largely ICT-illiterate population. The strong correlation between income level, education and ICT know-how points to the need for a more holistic policy approach addressing all levels of society and all categories of the population. Such an approach should not only explicitly address the issue of worker participation in the IS, but also that of citizens and private individuals.

These difficulties and opportunities have to be seen against the background of the overall challenges the CCs' still new democratic societies face in the transition to market economies. Their policy makers are under huge pressure to respond to the legitimate short-term needs and current problems rather than the long-term issues of development of an inclusive and competitive Information Society. Striking a balance between these two sets of policy objectives - acute societal day-to-day needs and IS development-related needs - is probably the most difficult policy challenge.

It is clear that choices made today will drive their economies and societies to alternative scenarios:

1. If present development imbalances are not addressed, there is a risk that though ICT islands may be successfully established in the CCs, large disparities between countries, regions, businesses and populations in this sector (and others) will remain. If this happens, they will not reap the social and economic benefits of the Information Society. They may even become isolated in the role of low wages/low quality countries, constrained to continue with lower added-value production and consumption patterns.

2. If the CCs wish to establish themselves in a stronger position, a policy push is needed, as well as sufficient financial support, to achieve a more balanced Information Society development. In times of limited public resources, striking the balance between competitive objectives (social/economic and short term/long term), targeting the major relevant factors of sustainable development and acting co-operatively with the private sector could be the guide lines for a sort of "Marshall plan" for the Information Society in CCs. Only such multi-layered policy push will ensure that the CCs build up their own socially inclusive and competitive Information Society.

What lessons can be learned here from past experiences in setting similar policies?

3. Transferable lessons from some ICT-related EU15 experiences?

3.1 A decade of EU15 experiences

The last decade of ICT-related development in EU15 Member States provides evidence of national successes and failures in specific economic, industrial, historical, social and geographical contexts. It is thus worthwhile understanding how relevant initiatives in given EU15 national/regional contexts have fostered conditions that favour the achievement of ICT-related regional and national development, and what this development has meant in each case.

We use the term "Tigers"[36] to describe regions or countries that have had fast and high economic growth rates, rapid reduction of unemployment rates and strong growth of employment rates, reduction of outward migration or even reverse migration, etc.

Six cases were selected and are briefly described below[37]:

- Austria: Austria was the fastest growing European economy from 1950-1960, only surpassed by the German "Wirtschaftswunder". The catching-up process of the 1950s and 1960s and above-average growth rates in the 1970s and 1980s make Austria one of the richest countries in Europe today. However, Austria's current favourable economic position cannot hide structural problems that will affect economic performance today and tomorrow. If we assess Austria's entry into the Information Society, we see structural change in a matured, developed economy. Hence, this is more the story of an "old Tiger", which has had to keep up or even shape development more than simply catch up. Austria's story is also one of old virtues, which have partly turned into burdens. Austria's institutional set-up with its strong corporatist elements and its orientation towards a consensus-orientated policy did well in the times of catching up, but did not achieve as much structural change as Finland or other countries. Therefore, Austria may be better described as a country in the post "Tiger" period.

- Dresden (Germany): Saxony was the most industrialised area in Germany before World War II. During GDR times, Dresden was the largest research centre, e.g., it piloted semiconductor production for Europe's first Megabit memory chip in 1988. In the course of re-unification of Germany, employment shrank considerably and growth rates only reached the relatively low West-German levels. The decision by Siemens, made in 1993, to invest the equivalent of € 1.38 billion in a semiconductor plant was essential to local development in the 90s. It was followed by AMD in December 1995 and by other players. In May 2002, AMD, Infineon and DuPont Photomasks founded AMTC, the Advanced Mask Technology Centre, as a global research centre. These major investments made it cost effective for about 30 international equipment producers to open permanent offices

[36] The concept of "Tiger" countries was originally coined in earlier decades with the observable rapid development of a series of Asian countries such as Taiwan, South-Korea, etc. Interesting enough, the model of development here already was largely based on the strength of a manufacturing industry (automotive, consumer electronics, etc.). The word has been used again, in particular when referring to Ireland as the "Celtic Tiger" in: Ferreira Luisa, Vanhoudt Patrick, February 2002. Catching the Celtic tiger by its tail: unveiling the causes behind the growth success story. EIB Sector Papers. European Investment Bank. Draft.

[37] These brief descriptions are based – under sole responsibility of the authors of the present report - on executive summaries written by the authors of the cases-studies and published in the "Tigers Synthesis Report" (See References at the end of this report): For Austria, Petra Wagner, Bernhard Dachs and Mar Ananos from ARCS; for Dresden, Arnd Weber from Forschungszentrum. Karlsruhe; for Greece: Amanatidou Effie and Damvakeraki Tania from Atlantis Consulting; for Flanders, René Wintjes, Claire Nauwelaerts and Theo Dunnewijck from MERIT; for Ireland, Terry Landers from CIRCA. The full case studies are listed in the annex and will be published during 2003.

themselves. New producers such as DAS or Wacker Siltronic (in Freiberg nearby) started businesses. About 10,000 semiconductor-related jobs were created in the region, more than initially expected. It is estimated that government subsidies of about € 1.2 billion will be much smaller than the expected social insurance and tax payments, which will be about € 5.9 billion by 2010. The economic sustainability of these initiatives will largely depend on whether the investors are able to make substantial profits in the future, taking into account the fact that during downturns they will have to continue production even when revenues fall below average costs. Therefore, the timing, size and duration of the next boom will be crucial.

- Flanders (Belgium): Flanders' general profile is that of a "Tiger" region – it is very wealthy and is part of a complex institutional structure which gives it a large degree of autonomy. It has a high population density and degree of urbanisation and hosts an important manufacturing industry. It also has a remarkably open economy in terms of trade and FDI, with very high levels of productivity (but salary costs are also remarkably high), and a highly educated population.
  Analysis shows that Flanders overall reaches at least the average European level for many aspects of the "Digital Society". However, this is not uniformly achieved across the different facets of this society:
  - Flanders is strong in ICT infrastructure development
  - It also hosts a reasonably important ICT sector
  - This strong position is not matched by similar rates of ICT-use
  - There are signs of a digital divide, as a comparatively large share of the population is not (yet) using ICT applications.

  Thus, potential for ICT-related development in Flanders is stronger than effective and diffused usage. The society as a whole has not realized the full potential benefit that ICT development can bring. ICTs are therefore under-exploited.

- Greece: IS development in Greece started later than in most of the other EU Member States. The first and second CSF (Community Support Frameworks) made a major contribution to building the telecommunications infrastructure, computerising the public services and developing mobile telephony in the country. However, the success could have been much greater if these efforts had not been hindered by internal organizational matters like limited experience of the public sector in the administration and implementation, lack of co-ordination, delays, fragmentation in the programme design and implementation, etc.
  At the end of 2002, Information Society initiatives were taking place within an economic environment marked by high growth rates - since 1995 the GDP growth rate has been higher than the EU average, low inflation and interest rates, and the elimination of public sector deficits. By 2002 the Greek economy was considered to be the fastest growing in the European Union. High development rates led to an employment increase, and unemployment has decreased during the last couple of years (but as a percentage, it remains one of the highest in the EU zone). Although real salaries increased, labour cost per unit has been steadily decreasing, with labour productivity growing fast, approaching the absolute levels of other developed economies. This fact is undoubtedly related to the major increase in investment over recent years. In the past few years, significant efforts have been made and expenditure in information and telecommunication technologies as a percentage of the GDP has almost converged with the EU average.
  The current situation, comparable to Portugal and Spain is characterised by some of the lowest figures in IS-related indicators, but supported by the highest growth rates.

- Ireland: Important early foundations for the Information Society in Ireland can be traced back to a number of events such as the early consideration given to FDI, the decision to expand the national Education system, initially at secondary level and then at tertiary level, and the accession to the EU. More recently, it was against a backdrop of emigration, unemployment and national indebtedness in the 1980's that the first of a series of National Partnership Agreements were made in 1987. These laid the foundations for the economic turnaround of the early 1990's. Through that combination of factors from the mid 1990's, the country was in the fortunate position of having a young educated workforce, a strong presence of FDI companies – particularly in industries relevant for the establishment of the Information Society (e.g. IT, Software, etc), and the fiscal resources to make strategic investment. In effect, those factors, which caused the Celtic "Tiger" period from the mid 1990's, also provided a fertile ground in which to launch an Information Society initiative. Ireland's Information Society initiative commenced with a report, published in 1996, which defined a vision for the country in the Information Society. The Government quickly recognised the potential of the Information Society in its own right, and as a result, the Information Society agenda became an integral part of its policy.
  Several recent international benchmark studies suggest that, notwithstanding the significant momentum behind the Irish Information Society, the activities have not been sufficient to propel the country to become a leader. Moreover, in two of the recent benchmark studies, Ireland's relative standing deteriorated between 2001 to 2002, suggesting that momentum behind the national Information Society is slowing.

3.2 Seven factors that strongly affected ICT-related developments in EU15[18]

The analysis of these cases identified the following seven factors, which, taken together, help us understand the essential aspects of dynamics leading to more or less successful ICT-related development in EU15 since the mid 90s. Their sequential presentation is, of course, artificial, and does not acknowledge sufficiently their effective interaction. This assessment was done without taking into account these factors' potential transferability to the context of the CCs.

3.2.1 A committed and adaptive (smart) public policy

ICT-related developments do not develop spontaneously, even less in an inclusive way. The examples of ICT-related development described above were initiated, in each case, by a strong pro-active public policy push. Rather than being centralised or top-down, these policies were adaptable and committed, allowed risk-taking and long-term objectives, and played a co-ordinating role. They were often holistic - or multi-layered - and were concerned with the country's (economic), development as a whole rather than ICTs alone, and thus benefited from a broader set of interdepartmental co-operative means. Specifically IS policies were absorbed into the broader category of development policies covering economic development, industry policy, science and technology, employment, regional policy, innovation policy, education, media, etc. These policies arose in countries suffering domestic crises or seeking to build strong identities. They were characterised by pro-activity (despite the high risk involved due to levels of uncertainty) and the apparent need for visible individual 'champions'. A key role for the government was to co-ordinate an on-going learning process and create predictability for most partners. This was achieved by, for example, establishing innovative partnerships among actors and by creating clear policy goals and roadmaps.

[18] On this subject see also: Dunnewijk T., Wintjes R.(Eds), 2003. Identifying factors of success and failure in European IST-related national and regional developments – Synthesis Report. ESTO/MERIT, Maastricht, Netherlands. And the accompanying National Case studies.

3.2.2 Co-opetition frameworks

'Co-opetition' refers to the search for the right, creative mix of co-operation and competition, through, for example, the co-ordinated meeting of diverse – possibly competing - actors in a goal-focused and time-determined taskforce. This mix aims at creating mutually beneficial situations by providing diversity, and at generating synergies that may result in common goals and trajectories for all. This concept calls for innovative institutional arrangements in public policy management[39], and includes the delegation of decision making and implementation capacity, as well as a citizen/entrepreneur-oriented mindset. Possible areas for co-opetition frameworks are infrastructure development for the public good, a safe digital environment, standards and interoperability, and also education, societal assessments, democratic initiatives, environment. Such arrangements appear also to be crucial in cluster development.[40] They feed the idea that reciprocal responsibilities pay better than "Winner takes all" games. They may nevertheless result in privileged arrangements, which escape democratic control (nepotism) particularly because they seek consensus among a set of contradictory interests. Business mentality and ethics[41], and their relevance in a newly open market economy are cornerstones for such trustful co-operative schemes.

Scale and scope matter in co-opetition. The geographical scale or the technological scope may be too large for a given set of actors to ensure commitment and pursue a common goal. International, national, regional partnerships are necessary and successful when they imply the adoption process is concomitant with adaptation. Smaller frameworks for co-opetition seem to be easier to handle, as shown by the successful examples of smaller countries or regional initiatives.

Governments play a particularly important role within co-opetition strategies. They must co-ordinate a diversity of actors at various scales and safeguard public interest and democratic representation. This role should also encompass the difficult issue of 'policy learning'. The environment for policy makers and partner-actors becomes highly complex and constraining.

3.2.3 From ICT Manufacturing industry to the adaptive use of the industrial profile

During the second half of the 1990's, several national economies have benefited from the contribution of ICT industries to added value, GDP and employment. A broad range of socio-economic indicators clearly confirm the "Tiger" status of countries such as Ireland, Finland, Sweden. In these cases, the presence of foreign and indigenous ICT manufacturing multinationals and/or that of a dynamic SME-sector that successfully developed international niche-markets has been an essential ingredient.

However, it is evident that national/regional industrial structure also matters. Countries and regions, which have a tradition in industrial manufacturing, may succeed in modernising this industry through ICT use. Relevant software production and use of ICTs are at the core of these IS strategies. Specific national or regional assets – including those in Services – can help

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[39] See also Chong and Calderon, 2000,"Economic growth and institutional quality", Economics and Politics, 12,1.

[40] The literature on regional innovation clusters shows that too much or too little competition between companies in a cluster may prevent growth of the cluster as a whole, due to the result of too much or too little diversity. The same holds for co-operation. See: Cowan, R. and R. Wintjes (1999) "Addressing the Creation, Operation and Exploitation of Localised Technological Change". Chapter 4.2 in: "Industrial Districts and Localized Technological Knowledge", Final Report to the European Union, DG XII. With respect to the role of cooperation and partnership in such network or cluster development we also refer to Granovetters' statement on "the strength of weak ties", see Granovetter, M. (1985) "Economic action and social structure: The problem of embeddedness" American Journal of Sociology, 91, 3, p. 481-510.

[41] Corporate governance is one of the concepts at the heart of those issues, when considering the "post-Enron" context in US and European private and state-owned businesses.

to generate ICT-intensive industries and are referred to as 'sweet spots', either 'given', historical, or strategically created on purpose.
Mature industrial products, that are no longer susceptible to large productivity improvements, are at risk of ending up in low cost surroundings. Traditional industries are product- or supply-oriented, and cannot escape simple cost-based competition; whereas modern industries may compete rather on quality and be much more marketing, or demand-oriented. In order to develop - as a country or a region - there is the need to seize the right opportunities, by developing innovative products/services or becoming more productive in close-to-mature ones. In both cases, pre-existing industrial and service structure, and its interplay with ICTs, plays a major role and triggers additional trickle-down effects to the rest of the economy.

3.2.4 A variety of financing tools

Foreign Direct Investment is a major tool for funding and developing an ICT (manufacturing) sector, and also for any other appreciation of ICT investment. Additionally, Venture Capital, Seed Capital, Public Subsidies and the protection of revenues through adequate regulation (for example: IPR) are also essential tools for promoting domestic development. ICT-related development is an uncertain path that necessitates a broad scope of trial and error, and thus supportive financial tools relevant to very diverse scales in initiative and risk. These are necessary to address the diversity of actors and starting points for innovative products and services to emerge.
An additional challenge is to also transform funding into knowledge transfers (Cooperation, R&D centres, Industry/university relations, etc.), incentives into committed involvement in the domestic economy and society, isolated bets into spillovers that generate more sustainable and embedded benefits. To achieve these goals, financial tools themselves should be integrated into a broader framework that encourages an entrepreneurial mindset. These tools need skilled and experienced managers. Without them, there is a risk that finances are entirely devolved to possibly fragile mono-industrial aims and/or highly volatile initiatives.

3.2.5 Education, info-culture, awareness: the intangible facet

National intangible assets play a major role in fostering the ICT potentials. These can be demand-side oriented, such as general educational level of the population – including explicit support to creativity and self-learning, technical/ICT but also general literacy, info-culture[42], etc. Others are facets of the supply chain: R&D capacities, fundamental research and curiosity-oriented research, technology transfer mechanisms, patent regulation, innovation policies, managerial capacity towards innovation and entrepreneurship..
Education always plays a role as a foundation of successful ICT-related developments, and has to be viewed in the longer-term. The upgrading of each generation's educational level is a central ingredient to development. Additionally, it is disputable whether our education systems should be supply-side oriented, directly supporting necessary professional ICT skills at the risk of being too "answer–oriented"[43], or whether they should be "question–oriented", fostering a general ability for "learning to learn" and creativity (which our modern societies also seem to need).. The same argument applies to info-culture.
While the necessity for political decisions concerning the supply-side – particularly those translating into hard investments in visible initiatives such as industry or science parks –

[42] "Infoculture" is approximated in the case studies as the will and capacity of a population to spend time on rather symbolic activities such as reading and writing, cultural heritage, etc.
[43] Some case studies mention the confrontation of those two types – or pedagogic methods - of education: "Yet Austria's education system is also associated with a conservative academic tradition which is more "answer"- than "question"-oriented (...). This implies that it does not broadly and proactively promote creativity and/or research skills."

seems obvious, governments also have an essential role to play in the development of a solid demand-side, through the relevant co-ordination of education, or through policies supportive to knowledge seeking behaviours. These intangible assets rely strongly on the level of awareness of the public and private decision-makers themselves. The managerial capacity of the decision-makers and their sensitivity to the issues raised by the IS, are themselves ultimately an essential facet of a country's intangible assets.

3.2.6 Creative use of specific contexts: alliances by position, language, identity

Geographical position or size may confer a specific role in geopolitics or international trade. Traditional migration flows may reveal unexplored networking capacity as well as access to foreign resources. Language specificity may translate into market access or identity seeking. Historical background may show attractive in present contexts.
Such features can be embedded in international alliances, in marketing behaviour and mobilising visions or in the distribution of managerial responsibilities. Strategic creativity matters more than the hurdles. Tackling these features, seemingly hurdles to ICT-development at national or regional level, may in fact reveal opportunities for creating competitive advantages. Not addressing them, however, often turns them into real weaknesses.

3.2.7 EU-policies

EU policies have an important impact on ICT-related development. In most cases they have supported development both by mandatory regulation frameworks and by awareness raising, direct subsidies or benchmarking initiatives.
Reciprocally, EU policies may also generate reverse effects. The focus on the EMU and the stability pact, and on the Enlargement process and its conditions, may have distracted some governments from other priorities.
Also, mere repetition of actions and measures that have been considered efficient in other places, without proper consideration, may lead to few or uneven results. Rather than simply reproducing earlier EU trial and error, these could be used as excellent benchmarks. They could help the CC ask the relevant questions and explore their own context before taking any action.

3.3 Potentials for a CCs' ICT industry-led IS development[44]

3.3.1 The EU15 "Tigers": a model for IS developments?

As "European Tigers", Ireland, Finland, Sweden have features in common and their position contrasts with that of the rest of Europe, and even sometimes the rest of the world. These three countries stand out with very strong ICT manufacturing profiles. ICT manufacturing takes up 40 -70% of their ICT workforce. Around 4% of their total employment and 8% of their total business employment is concentrated in the ICT sector and, at least in Ireland and Finland, this has affected (un)employment rates very favourably during the last decade. These countries generate a comparatively large share of their national ICT turnover and added value through ICT manufacturing, putting them far above EU15 averages. They also show above average turnover and added value in ICT manufacturing per person employed. Finally, their trade balance on ICT goods is positive - a remarkable achievement as compared to the rest of Europe – which, in turn, has had a positive impact on the overall national economy.

Further observation of these 3 cases reveals that they do not share a common model of development. Various strategies have been used, leading to positions which may have different longer term sustainability.

Ireland specialises in the manufacturing of office machinery and computers, with a very strong presence of foreign, mainly American, firms as a result of a long-term development strategy. Attracting foreign business firms is a strategy shared by Ireland and the UK[45], both of which

[44] On this subject see details in: Bogdanowicz M., 2003. The Future of the ICT Manufacturing Industry in CC. IPTS Internal Working Paper. IPTS, Sevilla, Spain.
[45] Koski, Rouvinen, Ylä-Antilla, 2001.

have developed information technology-oriented specialisation in close co-operation with US companies.

Finland is very specialised in the manufacture of television and radio transmitters and apparatus for line telephony. It is EU15's second largest telecommunication equipment producer after France (2001). This success is usually attributed to the history and activity of one large company, Nokia, and its suppliers. Similarly, Sweden shows also a very strong specialisation in manufacture of television and radio transmitters and apparatus for line telephone. In this case, success is usually attributed to the activity of one large company, Ericsson, and its suppliers. Developing strictly domestic companies, possibly in alliance with neighbouring countries, and specialising in communication technology[46] has been the Nordic strategy.

The case of the Dresden microelectronics cluster development, while historically coming a little later, shows some similarities with the "anglo-saxon" model of development described above in that it is embedded in microelectronics manufacturing, and depends – at least partly - on FDI and foreign companies. The case of Flanders has followed a very different path which has resulted in few effective domestic manufacturing industries. Whatever their industrial ambitions, one hesitates to call these 2 examples "Tigers" so soon and today's downturn of the ICT sector and the economy at large highlight the potential fragility of both initiatives.

These examples of "successful European Information Societies" may support the view that there is a need for a competitive ICT sector in Europe and, possibly, in each European country. It is argued that ICT industries have strongly demonstrated during the last decade that they directly account for an important share of Europe's economy and growth and at the same time, have been an essential enabler for competitiveness in other sectors of the economy.[47]

In line with such views, Booz-Allen and Hamilton argue in a report on the competitiveness of Europe's ICT markets published in 2000, that it is the stated goal of most governments to encourage vibrant indigenous ICT industries as a source of economic growth, quality employment and broader innovation. Market positioning, efficiency of production, quality of skills, context for innovation, etc., are important for the European ICT industry irrespective of who owns the ICT companies based in Europe. The authors claim that unless Europe addresses these issues, jobs and other benefits of the ICT industry are inexorably doomed to move out of Europe. The report concludes: "the competitiveness of Europe's ICT industry and markets will determine the future competitiveness of Europe."[48]

However, if this statement proves true[49], it may well be a result of the specific sector-related growth trend of the 1995-2000 period. While one cannot reduce the trajectory of the European

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[46] Idem.

[47] "In the 1990s, several factors combined to accelerate ICT diffusion and growth. Technological change, coupled with large price reductions, led to a surge in the use of digital technologies. With firms ready to exploit the opportunities offered by ICT, the liberalization of telecommunications and the growth of the Internet economy – allowing for economies of scale and network effects – brought new vigour and eagerness to investment in new technologies. In the US, business investment in computers and peripheral equipment, measured in real terms, jumped more than fourfold between 1995 and 1999. A rapid increase is also detectable in the EU, though not at the same pace as in the US . (...) ICTs make a direct and major contribution to the EU economy. In Western Europe, the ICT sector was worth 643 billion euro in 2001 or 7.5% of GDP. It grew by 5.1% in 2001 thanks to a 3.9% growth in IT and 6.4% growth in telecommunications, according to the European Information Technology Observatory." (European Commission, 2002)

[48] Booz-Allen & Hamilton, 2000, p.4

[49] Latest results of Growth Accounting exercises show that such statement can be challenged. ICT-User sectors may well be the real engines for long-term growth rather than ICT producers. See for example: Van Ark B., Inklaar R., Mc Guckin R., 2002. Changing gera: Productivity, ICT and Services Industries. Europe and the US. Research Memorandum. Groningen Growth and Development Center. Netherlands.

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"Tigers" to a mere "industrial" story – a view that would dramatically oversimplify their effective development – the long-term sustainability of their winning positions should be assessed from various viewpoints:

- they do occupy the positions of "first served" countries in an important, - though, for the time being, slowing down – sector of the economy. "Followers" have rather to assess the difficulty of challenging these positions.
- they have developed an industrial capacity in a sector exposed to strong global competition, and technologically-related cyclical patterns
- they have possibly developed a vibrant innovation capacity in both ICTs, and other branches, reinvesting their profits in a new cycle of value creation which makes them less dependent on the potential downturns of the ICT manufacturing industry.[50]

Consequently, the assessment of IS "successes" – and their transferability in time and space - has to be carefully scrutinised. The globalisation of that industry, the raise of strong Asian competition and ultimately the burst of the "new economy" bubble accompanying the global economic downturn have provisionally reduced the vigour of the ICT markets and that of the European industry prospects, leaving even less space for new challengers. It is thus quite possible that times have changed for those national Information Society projects which rely strongly on ICT manufacturing industry growth. This questions the transferability of the success and failure factors observed above to the context of the CCs, and more precisely, to the support given to their ICT manufacturing industries.

3.3.2 Potential CCs "Tigers": repeatable trajectories towards the IS?

The above observations question to what degree "Tiger" scenarios are possible for parts, or all of the CCs? Does their ICT industry show signs of being able to pull off a "Tiger" renaissance or not?

Identifying the potential "Tigers"

The ICT manufacturing production value generated by the CCs is small as compared to world or EU15 production. Considering the dramatic effects of the transition period –generally the early 90s – and the consequent collapse of most CCs ICT industries, this comes as no surprise. Since then , strong FDI inflow and the installation of most, if not all, major ICT multinationals in these countries have given local industries a second chance by integrating them into pre-existing production chains or by subcontracting specialised activities to them. Nevertheless, CCs production today does not appear to have radically transformed the position of an enlarged Europe on the global ICT production market. CCs' production only accounts for approximately 1% of the global market. EU25+ expands the EU15 production value by only 6% approximately. The scale of the change thus has little significance.

It is more interesting to look at country shares. Hungary leads with close to half the total production value in ICT manufacturing in CCs. It generates around three-quarters of the total electronic data processing (EDP) equipment production value. It also leads in consumer electronics (CE) and in components with around one third of the total CCs production value. Poland ranks second with around one fifth of the total production value of ICT manufacturing in CC. Turkey is third with a slightly smaller share than Poland. The Czech Republic comes fourth with a share of about one tenth of the total CCs production value. Poland's and

[50] This is partly reflected in the GERD measure (Gross Domestic Expenditure on R&D) where contrary to Finland and Sweden, Ireland seems to show serious weakness.

Turkey's high ranking can be attributed to their relatively larger size among the group of the CCs.[51] On the other hand, in the case of Hungary and the Czech Republic, it can be attributed to a form of ICT specialisation, which echoes that of some EU15 member states such as Ireland, Sweden and Finland, and potentially positions these countries in a "Tiger" scenario.

National CC production in each ICT segment as share of total CCs of ICT Manufacturing - 1998[52]

	EDP	Office equip.	Control and Instr.	Med and Ind	Radio com. mobiles, radars	Telecomm unications	Consumers electronics	Components	Total
Bulgaria	0.1%	6.8%	1.0%	0.6%	0.4%	0.6%	0.8%	1.2%	0.7%
Romania	1.5%	10%	11%	12%	3.2%	9.1%	1.7%	2.2%	3.9%
Slovenia	1.3%	6.8%	10%	4.0%	4.1%	7.9%	2.0%	5.2%	3.9%
Slovakia	3.3%	12%	4.4%	17%	11%	6.1%	2.0%	3.7%	4.6%
Czech R	4.4%	29%	21%	22%	18%	8.5%	3.2%	18%	10%
Turkey	7.3%	21%	3.3%	15%	21%	26%	32%	12%	18%
Poland	9.1%	13%	32%	10%	27%	35%	19%	25%	21%
Hungary	73%	0.9%	16%	19%	16%	8%	39%	32%	38%
CCs	100%	100%	100%	100%	100%	100%	100%	100%	100%
CCs/world	1.0%	0.6%	1.6%	1.4%	0.7%	3.9%	4.2%	0.7%	1.2%

Hungary, Poland, the Czech Republic and Turkey together contribute 80% of the total production value in ICT manufacturing of the CCs, and also generate approximately 90% of the total production value in each of three major segments – consumer electronics, EDP and components. Each of these countries has a specific specialisation:

- Hungary – EDP, followed by consumer electronics;
- Poland and Turkey - consumer electronics, followed by telecoms equipment;
- the Czech Republic - components, followed by control and instrumentation equipment.

Assessing the potential "Tigers"

These countries, and in particular Hungary and the Czech Republic, show high growth rates, decreasing unemployment and migration patterns. They usually score high on FDI flow, but rather low on R&D spending[53]. On the basis of these indicators, one could assess these countries as being close to "Tiger" status. Hungary is performing particularly well, and as its ICT industries are exclusively export-oriented, it is the only CCs country showing an overall positive trade balance on ICT goods.

Nevertheless, a closer look at the ICT manufacturing industry in these countries shows the following specific common weaknesses which may affect their development negatively in the mid-term:

- Dependency: the development of local ICT manufacturing capacity over the last few years has been highly dependent on external factors such as fluctuating FDI flow and its relation

[51] The size of ones' country total economy impacts potentially these measurements. This bias simply underlines the strong positions of smaller countries, such as Hungary or the Czech Republic.

[52] Source of data: Reeds Electronics, 2002. Calculation IPTS. Countries are ranked by increasing production value. Data is processed for 8 of the 13 candidate countries. Those 8 countries represent approximately 95% of the population and of the GDP of the 13 Candidate countries. Complementary data, mainly for the case of Estonia, would be valuable but should not transform radically the observed trends. Beyond 1998, 1999 data and forecasts on 2000 and 2001 confirm the overall trends.

[53] Gross Domestic Expenditure on R&D (GERD) is on average 0.84% of GDP in CCs as compared to 1.93 in EU15. Hungary, Poland and Turkey show even lower shares ranking from 0.6 (TK) to 0.8 (HU). Only the Czech Republic shows a 1.33% GERD. (Data 2000)

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to incentive policies, foreign firms' strategies (in an ultra-competitive environment, reallocation of activity may be the easiest option), strong competition from other European and non-European countries, access-to-market based competition for plants and R&D centres, strong dependency on overall economic health as export-oriented industries

- There is an observable shift of production specialisation towards the lower-value end of the ICT manufacturing market such as consumer electronics (which represent today less than 10% of total world production value) or even components. This shift accompanies a general shift towards assembling activities with low added value and little accompanying knowledge intensive activity (R&D for example). The reasons for this type of economic specialisation is partly due to a focus on cost-based competition strategies rather than knowledge-based ones.
- In all these countries – with the exception of Hungary – the overall trade balance on ICT goods is negative. Even though these countries show a stronger ICT manufacturing industry than others, their economy has to absorb the effects of a much larger demand. Poland has a negative annual trade balance of approximately 2 Billion $ on ICT products, and the Czech Republic has one of 1 Billion $.
- Last but not least, it may well be that these strategies, and the industry pending, will be affected by accession itself. While the single market rules will impact positively on export capabilities as they will ease the logistics of doing business, it may well be that some facets of today's policies will be subjected to scrutiny to ensure they meet competition rules. Excessively generous incentive policies for example may be disallowed.

When considering these factors and observing the most recent decisions[54] by companies in such countries, it seems fair to conclude that developing "classical" Tigers' strategies limited to encouraging foreign or domestic companies to foster and grow in the domain of ICT manufacturing may be unwise today. Though such strategies have been rewarding in the 90s, the position today of western European "Tigers" – Ireland, Finland, Sweden - has also been weakened by the downturn of the market and the difficulties in the Telecom sector. Thus, the time may not be right for new candidates to restrict themselves to such scenarios.

Additionally, the CCs may still lack some of the essential ingredients that have made the ICT Industry in some west European countries such a success: a committed and strongly supportive policy focus, institutional creativity allowing the necessary consensus (about targets) and decision building (about actions to be taken) across a broad range of partners, a large diversity of solid financial tools able to support the creation (and possible failure) of a multiplicity of diverse initiatives and players of various scales.

There is nevertheless room for an ICT industry in CCs. Some parts of the ICT industry could be competitive on a global scale, for example software supply, which depends on skills and human resources, rather than hard core plant and machines that can be moved from one country to another. In CCs, the move towards a market economy inspired individual entrepreneurship that has driven the start-up of many economic activities. As a result many successful businesses developed in an environment of uncertainty and risk, unattractive to foreign investors. Domestic software firms[55] in many CCs have shown high competencies in ICTs and many of them have provided successful services to US and EU companies for design, testing, maintenance or support. Software firms in Bulgaria, Poland and Romania,

[54] Those decisions translate in observable re-investment and reallocation decisions in Asian countries, in particular China and/or residual investment in Consumer Electronics assembling.

[55] Mroczkowski T, E.Carmel, N.Saleh (2002), Opportunities and barriers to integrating Central Europe into the transatlantic information economy, Interim report, American University, Washington, D.C.

for example, have shown considerable expertise in tasks such as developing fully integrated systems or system components. In Romania, most software companies are skilled in developing specialised applications and databases, whereas few have expertise in the areas of CAD/CAM software, programming languages and expert systems.

As the software industry is mainly 'brain' driven, the future looks promising. First, the historically important R&D potential in ICT, with highly qualified researchers has encouraged multinational companies (IBM, Nokia, Xerox, Ericsson) to establish R&D centres.[56] In addition, international benchmarking indicators[57] rank some of the CCs such as Hungary, Estonia, Czech Republic, and Slovak Republic high as compared to EU countries, while other sources[58] report high concentrations of IT certified professionals in Romania, Bulgaria and the Baltic countries. Due to their high educational standards, the Czech Republic, Hungary and Poland are very popular for outsourcing of software development and support, as well as for establishment of subsidiaries of large foreign ICT companies.[59] Estonian IT companies, for example, are becoming more and more integrated into the supply chains of their Nordic counterparts – thus getting leading edge know-how and project management expertise. With its well-educated population and government emphasis on ICT development, Estonia is considered to be an 'excellent test market for new technologies'.[60] Its software industry is doing well but it is claiming ever more support from the Government.[61]

Software services represent one of the fastest growing sectors of the IT market in the CC. Particularly strong growth is seen in the market for packaged software, such as PC applications software, enterprise resource planning applications and application tools for database development and management. Most growth in the software and services sector is derived from large-scale projects in banking, financial services, government administration, telecommunications and industry. Many domestic software companies have exploited the local knowledge of customers and the local language as competitive assets. Local firms play an essential role as system integrators, value-added service providers, software developers and training centres, and thus dominate the segment for computer services such as installation, implementation, and customer training.[62] They are often ahead of foreign companies in the local market in areas like software for company management, financial accounting, banking and SMEs.

The ICT manufacturing industry could also come up with local solutions to specific domestic needs. Some issues raised by the implementation of the Acquis Communautaire, such as Universal Service and Internet access, may well serve as catalysts for domestic R&D and procurement. This could also be the basis for the building up of a domestic ICT manufacturing industry, with an export-oriented outlook (i.e. exporting local solutions to similar transition and developing economies).

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[56] Antelope Consulting & Commonwealth Telecommunications Organisation (2000), Improving the quality of transition in Central and South Eastern Europe through ICTs

[57] Center for International Development, 2002. Network Readiness Index. Harvard University. USA

[58] The Brainbench, 2001. Global IT IQ Report. Brainbench. USA. (http://www.brainbench.com)

[59] STAR Consortium (2001), issue report 17, Creation, Supply and Demand of ICT Skills in Peripheral and Middle-Income Countries

[60] CEEBIC, http://www.mac.doc.gov/eebic/countryr/estonia/market/EstTeleServices.htm

[61] Ernst & Young, 1999

[62] Weber et al., The Wider Picture: Enlargement and Cohesion in Europe, Futures project Series No.15, IPTS, 1999

To sum up: there are chances for (some) CCs to build up and maintain a strong ICT industry, but this may well be mainly in the software sector. However, the degree to which this will be sustainable in the longer term, or strong enough to generate "Tiger" dynamics remains very questionable.

4. Conclusions: integrating Information Society Strategies in inclusive and sustainable growth-oriented development in the CCs

When we consider the political framework of the Accession (Section 1), the IS state-of-play in the CCs (Section 2) and the potential IS strategies in CCs (section 3), we have to conclude that a simple scenario for the road forward does not exist. Moreover, what made a success of certain regions and countries in EU15 in the 90s will be almost impossible to repeat in the CCs.

This leads us to some provisional conclusions, which indicate several choices to be made.

4.1 Bread through Broadband ?

CCs confront, and will continue to confront, difficult choices between "Bread and/or Broadband". Only those courses of action that offer a compromise to this dilemma will be politically sustainable – i.e. they should deal simultaneously with welfare issues *and* economic growth. Technology will only be seen as affordable, if it will clearly contribute to citizens' well-being. The strong disparities that accompany the Enlargement process at European level, and the potential complex digital divide that may derive from these disparities are illustrations of this dilemma. Moreover, many countries may actually need to improve their institutional organisation and undergo an awareness raising process, rather than simply upgrade their infrastructure or technology.. The question is how to best put IS policy strategies at the service of a country's democratic development, while optimising its resources and economic output.

4.2 Emulating or Learning

While the example of some Western European countries could be seen as showing the way forward, the simple emulation of these "best practices" is seen as less and less relevant for CCs. In particular, Information Society development should not be seen exclusively as targeted industrial development around the ICT sector itself. What was possible for the EU15 "Tiger" countries during the last decade may no longer be possible today.. Ireland, Finland, Sweden should not be seen as transferable examples.

Furthermore, in a strongly competitive and global industry, it is obvious that not everybody can play a major role, and that the current state of the market points to an uncertain future for the ICT industry, even in EU15 countries or regions. "Benchlearning[63]" from EU15 successes and failures is making the best possible use of the accumulated European – but also Asian and US – experiences.[64]

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[63] A term coined by one of the experts, Mr Jeremy Millard

[64] Furthermore, an insight in successful social and economic ICT-related practices in so-called development countries could also be inspiring.

4.3 ICT Sector or ICT Users

ICTs are potential tools for the modernisation of the economy, and possibly for the building of an equitable, democratic and sustainable society. Growth is expected to come from intensive user sectors – at present, for example, retail and wholesale, banking and insurance, etc.. – rather than from the ICT industry itself.[65] Expenditure on technological roll-out per se, in particular when supported by public subsidies or incentives, should be carefully monitored if it is to pay off.

The development of an ICT sector can nevertheless be supported by industrial and technology policy, if it is adapted to domestic needs and assets, and the global competitive context. Exportable competencies could, in time, result from this, - for example by producing value added services and targeted or high-tech goods (rather than being a low cost player in ICT "commodities"), or using the constraints of the *Acquis* as a leveraging tool for domestic R&D, production and procurement.

Thus, FDI, R&D and public expenditure, and any other public support to the ICT industry in each CCs, could contribute to long-term development, which should be rooted in effective needs/markets, rather than favouring a domestic – but highly dependent - ICT manufacturing sector.

4.4 Doomed to *Acquis* Compliance, or benefiting from EU Membership

The Enlargement process contains possible financial and political burdens. Compliance to the *Acquis Communautaire* offers the virtues of effective harmonisation, and a level playing field for the market economy to prosper. As regards ICTs, it offers the additional advantage of stability and technological neutrality. Nevertheless, it also raises important (financial) challenges – such as those related to the effective implementation of Universal Service Obligations, that might distract attention from other priorities and could undermine forthcoming decisions. Maximising the chances of converting *Acquis* compliance into opportunities may be the most productive solution to this issue.

EU political objectives and programmes – such as eEurope 2005[66], the R&D Framework programme, the Cohesion policy and its related Funds - can also be strongly supportive in the way forward. Ensuring that these policies and programmes allow the negotiation of well co-ordinated and holistic regional and national development plans may be one of the cornerstones of progressive – but tailored – convergence.

4.5 Building infrastructures but also conditions for services and citizenship

In line with the need to consider ICTs as tools rather than objectives in Information Society strategies, complementary approaches need to be taken to move from the development and deployment of ICT infrastructures into the broader development of enabling contexts for the users. These should be targeted at having citizens make full use of ICTs as tools for better

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[65] A better understanding of the CCs assets in several sectors as ICT users is still to be developed. For example, World Bank's 2003 report on Lithuania ("Lithuania. Aiming for a Knowledge Economy", March 2003) explicitly refers to sectors such as textiles, wood processing and agribusiness. While this goes n line with some discrete observations in developing economies, it remains to be seen if the modernisation of such sectors can effectively support growth in a domestic economy at longer term. Views about "service economies" as equivalent to Knowledge-based economies contradict such positions.

[66] As integral part of the broader Lisbon objectives and its numerous tools such as the Broad Economic Policy Guidelines, the Employment Guidelines, the Action Plan on Environmental Technologies or last but not least the building of the European Research Area

quality of life, democratic participation, and access to more competitive products and services. Socio-economic aspects such as trust in institutions and trust in technology, better managerial capacities, a legal framework for consumer protection, a frame for political information and participation, security and privacy concerns need to be addressed. The I-banking case, one of the most developed e-commerce applications, illustrates this need.

It is even more important, when aiming at a Knowledge Society, that our focus switches from purely economic participation to the broader improvement of public citizenship and private life. More attention should be given to the population's overall (techno-)inclusion (and possibly voluntary switch-off), the upgrading of citizens' competencies through informal trajectories of acquisition, the expression of opinion through new channels and the full respect of citizens' democratic (on-line) rights and opinions.

4.6 Institutional creativity: need- and user-defined societal project management rather than industrial/technological project objectives

Information Society strategies are expected to be targeted at a need-defined societal and developmental project. IS visions, their goals and how these will be achieved are expected to be deeply rooted in a context-related analysis of the conditions (strengths and weaknesses) of a country or a region. Each CCs' conditions and needs will be different and different from those of the EU15, even when framed by the rules of the Single Market, the Acquis Communautaire or the present EU policies.

The de-coupling of Information Society strategies from the exclusive creation or support to (national) ICT industry clusters is a necessary step towards better adapted goals and means. An industrial policy – focused on services rather than manufacturing – is still necessary, but it should be part of a broader strategy targeting, for example, the general modernisation of existing economic strength, education, social welfare or governance. This approach necessitates co-ordination and consistency between ICT policy strategies and education, employment, or administration policy strategies, at different national and regional levels, and with the national development plans.

Such strategies need to be driven, from their conceptualisation to their implementation, by the *users* of Information and Communication Technologies, be they corporate or civil. The importance of having in place the necessary innovative institutional settings which allow such processes to develop is a core lesson from the EU15 experiences. In each specific context, a variety of actors from national politicians to industrialists, unions or local NGOs have a role to play. Bottom-up strategies are needed and should be taken into account whenever possible.

4.7 Targeting the Knowledge-based society: Economy and Democracy

The Lisbon objectives identify the integration of Information Society strategies in the broader development of a European knowledge-based society as an essential issue. In this context, ICTs are seen much more as functions, or enablers of economic, political, social and intellectual development, than an end in themselves.

The knowledge-based society concept is still under discussion. It has acquired negative connotations due to the rhetoric surrounding the "new economy" and its subsequent downturn. However, it is an still an open concept, offering a challenging change of course which must be debated, matured and enshrined in pragmatic down-to-earth decisions and actions. It has already generated a considerable amount of very diverse literature on issues such as the service economy, intangible goods and investments, the role of ICTs, education and life-long

learning, human resources and capital, innovation processes and network effects.[67] CCs will have the opportunity to make choices and define trajectories as regards these issues. In all cases, it seems they will have to strike the right (and evolving) balance between various alternatives, for example:

- How far should economic development be articulated around cost-based competition (low wages, incentives, low added value activities) or knowledge-based competition (high qualification, R&D, design, high end and upstream activities, etc.). What share of economic activity should be high-tech, and what share should be modernised traditional activities(in both services and industry) in order to promote effective growth
- Should knowledge be interpreted, legally defined and used as a competitive advantage or as a "common good" which could be shared as an enabler of innovation processes?[68]
- Should educational reform support basic and generalised education or focus on specialised professional training? Should it favour the spread of broad educational level upgrading or that of a predetermined set of competencies? Should it be question or answer-oriented; etc.
- Should research be driven by curiosity, or should it stay close to market R&D; should funding favour large international projects or should it allow small-scale individual research; supporting disruptive and networking development processes or rather rational and standardised approaches; etc.

Furthermore, building a Knowledge-based society may be an opportunity for enhancing the role of the citizens - as individuals, users, entrepreneurs, consumers - in the political and societal debate. How citizens view the present and future role of ICTs in their everyday life, at home or at work, may have much to do with the shared elaboration of a developed, cohesive and sustainable society. Participation – and not only economic participation - governance, and equity could become the cornerstones of the Knowledge Society debate and shape our futures. Or maybe not. The CCs have a historical opportunity for defining their direction during this decade, and offering new perspectives to European policy and new challenges to technology and research.

[67] See for example: European Commission, DG Enterprise, 2002. Innovation Tomorrow. European Communities. Luxembourg.

[68] These two dimensions of Knowledge-based Society prospective are partly inspired by the experts debate, and partly by an article from one of its participants, R.Galar, 2003. Gospodarka oparta na wiedzy – szesc watpliwosci. Politechnika Wroclawska, (Unpublished draft)

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[69] The lists of External Experts and EC personnel is made out of the persons having participated directly to the discussions rooting the elaboration of this report in February 2003. Several earlier feed-back loops, organised in parallel for each of the discrete research reports, have mobilized possibly over a hundred of specialised experts in the various domains that have been discussed above.

Annex 1(a):

Policy Implications brainstormed by the experts in the conclusive session of the February 2003 workshop

The use of the Acquis

- Awareness of national authorities concerning the *Acquis Communautaire*
- Relation between "new regulation rules "and social policies

How to develop intelligent convergence policies?

- Develop "foresight with insight"
- Emphasis on demand policies linked to social, political and economical issues
- Flexible and nuanced policy
- Less rules, space for thinking!
- Think EU25+ rather than national
- Use of structural funds in intelligent policies

IS Strategies

- Consider different technological options. No path dependency
- Creative use of context: shape IS initiatives accordingly to local needs and strengths
- No IS policy in isolation
- IS policies as part of KBS policies
- Use of public procurement

Multilevel coordination needs

- Multilevel governance
- Regional development policy
- Public/private partnerships for creative thinking and acting
- Organise public/private participation and consultation in political decision making process

Technology

- Technology neutrality is helpful
- Open source software policy

Education

- An education policy that does not feed braindrain
- Building steeples of university excellence
- Support to public general education and Lifelong Learning (at work)

Economy

- More e-content initiatives
- Software industry
- Encourage spill-overs from ICT industry to other sectors

Awareness rising

- Media
- Awards
- Involvement of real stakeholders

Annex 1(b):

Research Implications brainstormed by the experts in the conclusive session of the February 2003 workshop

Globalisation / ICT Industry

- Gain a better picture of global competitiveness of the EU ICT Industry
- Economic Geography
- Impacts of the Acquis Communautaire on CC13

Integration of IS policies in multipurpose policies

- Inclusion policies
- Educational policies

R&D systems

- Linking into local needs
- Linking with the educational system

Case studies

- Successes and failures
- Software industry developments

Quality of life

- And Employment
- And inclusion
- And Education/skills

Measurement issues

- Indicators issues
- Qualitative/quantitative issues
- Minority positions / discrete initiatives

Annex 2:

STRUCTURAL INDICATORS
ANNEX 2 TO THE BARCELONA REPORT 2002 [70]

42 indicators
General Economic Background a. GDP per capita and real GDP growth rate b. Labour productivity (per person and per hour) c. Employment Growth (total and by gender) d. Inflation rate e. Unit labour cost growth f. Public balance g. General government debt
I. Employment 1. Employment rate (total and by gender) 2. Employment rate of older workers (total and by gender) 3. Gender pay gap 4. Tax rate on low-wage earners 5. Life-long learning 6. Accidents at work (serious and fatal) 7. Unemployment rate (total and by gender)
II. Innovation and Research 1. Spending on Human Resources (Public expenditure on education) 2. R&D expenditure (BERD and GERD) 3. Level of Internet access (household and enterprise) 4. Science and technology graduates 5. Patents 6. Venture capital (early stage and expansion & replacement) 7. ICT expenditure
III. Economic Reform 1. Relative price levels and price convergence 2. Prices in the network industries (telecommunications and energy) 3. Market structure in the network industries (telecommunications and electricity) 4. Public procurement 5. Sectoral and ad hoc State aid 6. Capital raised on stock markets 7. Business investment
IV. Social cohesion 1. Distribution of income (S80/S20) 2. Risk of poverty (before and after social transfers) 3. Persistent risk of poverty 4. Regional cohesion (unemployment) 5. Early school-leavers 6. Long term unemployment 7. Population in jobless households
V. Environment 1. Greenhouse gases emissions 2. Energy intensity of economy 3. Volume of transport (freight and passengers) 4. Modal split of transport 5. Urban air quality 6. Municipal waste (collected, landfilled, incinerated) 7. Share of renewables

[70] Source: EUROSTAT IS WG. This list has been annually discussed and adapted. Latest refined versions are to be found on the relevant EC website

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Annex 3:

eEurope 2005: An information society for all

As presented to the Sevilla European Council[71]
21/22 June 2002

Executive summary

The objective of this Action Plan is to provide a favourable environment for private investment and for the creation of new jobs, to boost productivity, to modernise public services, and to give everyone the opportunity to participate in the global information society. *e*Europe 2005 therefore aims to **stimulate secure services, applications and content based on a widely available broadband infrastructure.**

The Barcelona European Council called on the Commission to draw up an *e*Europe action plan focussing on "*the widespread availability and use of broadband networks throughout the Union by 2005 and the development of Internet protocol IPv6 .... and the security of networks and information, eGovernment, eLearning, eHealth and eBusiness*". This action plan will succeed the *e*Europe 2002 action plan endorsed by the Feira European Council in June 2000. *e*Europe is part of the Lisbon strategy to make the European Union the most competitive and dynamic knowledge-based economy with improved employment and social cohesion by 2010. *e*Europe 2002, with the joint effort of all stakeholders, has already delivered major changes and has increased the number of citizens and businesses connected to the Internet. It has reshaped the regulatory environment for communications networks and services and for ecommerce and opened the door to new generations of mobile and multimedia services. It is providing opportunities for people to participate in society and helping the workforce to acquire the skills needed in a knowledge-driven economy. It is bringing computers and the Internet into schools across the Union, bringing governments on-line and focusing attention on the need to ensure a safer on-line world.

The information society has much untapped potential to improve productivity and the quality of life. This potential is growing due to the technological developments of broadband and multi-platform access, i.e. the possibility to connect to the Internet via other means than the PC, such as digital TV and 3G. These developments are opening up significant economic and social opportunities. New services, applications and content will create new markets and provide the means to increase productivity and hence growth and employment throughout the economy. They will also provide citizens with more convenient access to information and communication tools. Most services are provided by the market. Developing new services needs significant investment, most of it from the private sector. But there is a problem: funding more advanced multimedia services depends on the availability of broadband for these service to run on, while funding broadband infrastructure depends on the availability of new services to use it.

Action is needed to stimulate services and infrastructure to create the dynamic where one side develops from the growth of the other. Both developing services and building infrastructures are mainly tasks for the private sector and *e*Europe will create a favourable environment for private investment. This means not only developing an investment friendly legal framework but also taking action that stimulates demand and so reduces uncertainty to private investors. *e*Europe 2005 applies a number of measures to address both sides of the equation simultaneously. On the demand side, actions on e-government, e-health, e-learning and ebusiness are designed to foster the development of new services. In addition to providing both better and cheaper services to citizens, public authorities can use their purchasing power to aggregate demand and provide a crucial pull for new networks. On the supply side, actions on broadband and security should advance the roll-out of infrastructure. The Lisbon strategy is not just about productivity and growth but also about employment and social cohesion.

[71] COMMISSION OF THE EUROPEAN COMMUNITIES, COM(2002) 263 final. COMMUNICATION FROM THE COMMISSION TO THE COUNCIL, THEEUROPEAN PARLIAMENT, THE ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS

*e*Europe 2005 puts users at the centre. It will improve participation, open up opportunities for everyone and enhance skills. *e*Europe contains measures regarding einclusion in all action lines. One important tool to achieve this is to ensure multi-platform provision of services. It is generally accepted that not everyone will want to have a PC. Making sure that services, especially online public services, are available over different terminals such as TV sets or mobile phones is crucial to ensuring the inclusion of all citizens.

The *e*Europe action plan is based on two groups of actions which reinforce each other. On the one hand, it aims to stimulate **services, applications and content**, covering both online public services and e-business; on the other hand it addresses the underlying **broadband infrastructure and security matters**.

By 2005, Europe should have:
- modern online public services
  - e-government
  - e-learning services
  - e-health services
- a dynamic e-business environment

and, as an enabler for these
- widespread availability of broadband access at competitive prices
- a secure information infrastructure

The action plan comprises four separate but interlinked tools.

Firstly, **policy measures** to review and adapt legislation at national and European level; to ensure legislation does not unnecessarily hamper new services; to strengthen competition and interoperability; to improve access to a variety of networks; and, to demonstrate political leadership. *e*Europe 2005 identifies those areas where public policy can provide an added value and therefore focuses on a limited set of actions in priority areas. Some key targets are:

- Connecting public administrations, schools, health care to broadband
- Interactive public services, accessible for all, and offered on multiple platforms
- Provide online health services
- Removal of obstacles to the deployment of broadband networks
- Review of legislation affecting e-business
- Creation of a Cyber Security Task Force

Secondly, *e*Europe will facilitate the exchange of experience, of **good practices** and demonstration projects, but also of sharing the lessons from failures. Projects will be launched to accelerate the roll-out of leading edge applications and infrastructure.

Thirdly, policy measures will be monitored and better focussed by **benchmarking** of the progress made in achieving the objectives and of the policies in support of the objectives.

Fourthly, **an overall co-ordination of existing policies** will bring out synergies between proposed actions. A steering group will provide a better overview of policy developments and ensure a good information exchange between national and European policy makers and the private sector. This steering group would also make an early participation of Candidate Countries possible.

This action plan is a proposal to Member States to take some far-reaching commitments. It is an invitation to the private sector to work with the Commission and Member States to realise the *e*Europe objectives. It sets out the initiatives the Commission will or is willing to take. Overall the action plan sets the scene for a co-ordinated European policy approach on information society issues. The *e*Europe

action plan should be confirmed as a key element in the Lisbon strategy. If successful, this plan will have a significant impact on growth and productivity, employment and social cohesion in Europe.
The European Council in Sevilla is expected to endorse an Action Plan and invite Council and Parliament to adopt as quickly as possible the necessary legal and budgetary instruments to implement it.

Annex 4:

Definition of ICT activities, based on NACE, rev.1 nomenclature

ICT manufacturing industry:

3001 Manufacture of office machinery
3002 Manufacture of computers and other information processing equipment
3130 Manufacture of insulated wire and cable
3210 Manufacture of electronic valves and tubes and other electronic components
3220 Manufacture of television and radio transmitters and apparatus for line telephony and line telegraphy
3230 Manufacture of television and radio receivers, sound or video recording or reproducing apparatus and associated goods
3320 Manufacture of instruments and appliances for measuring, checking, testing, navigating and other purposes, except industrial process control equipment
3330 Manufacture of industrial process control equipment

ICT services:

Wholesale
5143 Wholesale of electrical household appliances and radio and television goods
5164 Wholesale of office machinery and equipment
5165 Wholesale of other machinery for use in industry, trade and navigation

Telecommunications
6420 Telecommunications

Consultancy services
7133 Renting of office machinery and equipment, including computers
7210 Hardware consultancy
7220 Software consultancy and supply
7230 Data processing
7240 Database activities
7250 Maintenance and repair of office, accounting and computing machinery
7260 Other computer related activities

Annex 5

ICT Goods in the Standard International Trade Classification (SITC)

SITC Rev.3 for ICT Products	Examples for SITC
Components	Ex.: TV and X-ray tubes, diodes, transistors, cells, integrated circuits, capacitors, resistors, connectors, switches, relays, printed circuits boards, etc.
Electronic Data Processing Equipment (EDP)	Ex.: Computers, complete systems, peripherals storage units, printers, and all parts and accessories
(Radio)Communication incl. Mobile Telecommunication	Ex.: Radars, navigational aid, radio communication apparatus, Mobile telephones, pagers, transmitters, accessories and parts
Telecommunications equipment	Ex.: Switching equipment, telephone sets, answering machines, accessories and parts
Consumer Electronics (CE)	Ex.: TV sets, VCRs, Video cameras, satellite receivers, radios, tape recorders, record and CD players, electr. Watches clocks and flashlight
Office Equipment	Ex.: Electronic typewriters, calculators, cash registers, accounting machines, photocopiers, etc.
Medical and Industrial Equipment	Ex.: oscilloscopes, nucleonic instruments, signal generators, test instruments, etc.
Control and Instrumentation	Ex.: Part: Industrial and Process control systems for data logging, monitoring, displaying, recording and control

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